In the United States Patent and Trademark Office

Serial Number:
Appn. Filed:
Applicant(s): **ALEKSANDR L. YUFA**
Appn. Title: **" METHOD AND DEVICE FOR COUNTING AND MEASURING PARTICLES "**
Examiner:
Group Art Unit:

Mailed: June 27, 1997

At: COLTON, CALIFORNIA

Petition to Make Special

Assistant Commissioner for Patents
Washington, District of Columbia 20231

Sir:

Applicant hereby respectfully petitions that the above application be made special under MPEP Sec. 708.02 for the following reason; attached is a declaration in support thereof:

( ) I. Manufacturer Available*;
( ) II. Infringement Exists*;
( ) III. Applicant's Health Is Poor;
( ) IV. Applicant's Age is 65 or Greater;
(X) V. Environmental Quality Will Be Enhanced;
( ) VI. Energy Savings Will Result;
( ) VII. Recombinant DNA Is involved*;
( ) VIII. Special Procedure: Search Was Made*;
( ) IX. Superconductivity Is Advenced.)

Attachment: Declaration in Support of Accompanuing Petition to Make Special - 3 pages.

Very respectfully,

Signature

ALEKSANDR L. YUFA
Name

June 26, 1997
Date

Residence: **698 CYPRESS AVE., COLTON, CA. 92324-1952**
Phone/Fax: (909) 370-4454

Correspondence Address: **P.O. BOX 1677 COLTON, CA. 92324**

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Declaration In Support of Accompanying Petition to Make Special Reason V -- Enhancement of Environment Quality

In support of the accompanying Petion to Make Special, applicant declares as follows:

1. I am the applicant in the above-identified patent application.
2. The invention of the above application will materially enhance the quality of the invironment of humankind by contributing to the restoration or maintenance of the basic life-sustaining natural elements of air and water in the manner described below.
3. Specifically, the invention of the above application is an improved particle measurer and counter. It provides a more efficient, correct and sensitive counting and measuring of the particles in the air (interrupted air flow tubing trace) or water contamination (uninterrupted water /liquid/ flow tubing trace) composition. By an improved method, an improved device is able to measure and count the particulates with Sensitivity essentially less than 0.1 Micron rate in comparison with the now existing devices, wich by the made Patent Search [the Patent Search (Special Procedure) - Information Disclosure Statement /IDS/ was made and sent together with Application - see Trans- mittal Letter from 01.02.97. The IDS includes Form-1449 -10 pages, the Depth of the Patent Search - 8 pages. The Patent Search was made for the USA (27 yrs.) and for five /5/ leading countries: Japan (24 yrs.), Great Britain (14 yrs.), Germany (17 yrs.), Russia (25 yrs.), France (25 yrs.). For the invention of the above application: U.S. Cl. - 356/336 (Int. Cl. - G01N 15/02), Subclass - 356/343 (Int. Cl. - G01N 21/00), Field of Search: 356/335-343; 356/73, 246, 301, 39, 317, 318, 244, 37, 397, 436, 440-442; 250/218, 573-576, 227.11, 435, 222.2, 564; 117/65; 313/323; 88/14; 377/10, 11, 53; 372/33, 34; 73/28.01; 364/555. The Patent Search was made by Dr. Aleksandr L. Yufa (Ph.D. degree in Electronics and M.S. degree in Engineering), having twenty four /24/ foreign Patents with self-Patent Search], Analysis and Calculation have the Sensitivity usually not exceeding 0.1 Micron rate.
4. By more efficient and authentical counting and measuring the contamination (particles) in the drinking water, can be prevented such tragedies as it was in Milwaukee in 1993 (the some information about it is attached to this Declaration).

5. I further declare that all statements made herein of my own knowledge are true and that all statements made upon information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application and any patent issuing therefrom.

Attachment: Information was received on Internet - 1 page.

Very respectfully,

Signature ALEKSANDR L. YUFA Name June 26, 1997 Date

Residence:

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96/01/30--U.S. v Pacific Scientific Company, Complaint
UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA, Plaintiff, v. PACIFIC SCIENTIFIC COMPANY, Defendant.	Civil Action No.:

COMPLAINT

The United States of America, acting under the direction of the Attorney General of the United States, brings this civil action to obtain equitable and other relief against the defendant and alleges as follows:

1. The United States brings this antitrust case against the acquisition by Pacific Scientific Company ("Pacific Scientific") of all the outstanding shares of Met One, Inc. ("Met One").

2. Pacific Scientific and Met One compete vigorously in the manufacture and sale of drinking water particle counters; they are the leading competitors in this market. Drinking water particle counters are used by municipal water authorities to protect against contamination of public drinking water supplies by potentially deadly microorganisms. In 1993, 28 people in Milwaukee died as a result of drinking water contamination by one such microorganism -- Cryptosporidium. At the time of that tragedy, Milwaukee had not installed drinking water particle counters. Since 1993, Milwaukee has installed drinking water particle counters.

3. If the combination of these two drinking water particle counter manufacturers were permitted, competition to sell drinking water particle counters to large and small municipalities throughout the United States would be reduced substantially or eliminated. Municipalities likely would face higher prices and receive lower levels of quality and service.

In the United States Patent and Trademark Office

Mailed: _____

At: COLTON, CALIFORNIA

Assistant Commissioner for Patents
Washington, District of Columbia 20231

Sir:

Please file the following enclosed patent application papers:

Applicant #1, Name: **ALEKSANDR L. YUFA**
Other Applicant(s): N/A
Title: **"METHOD AND DEVICE FOR COUNTING AND MEASURING PARTICLES"**
(Provisional Patent Application: No. **no information yet,** Date: **June 02, 1997)**

(**X**) Specification, Claims, and Abstract: Nr. of Sheets: **20 sheets**

(**X**) Declaration for Utility Patent Application: **1 sheet** Date Signed: **June 26, 1997**

(**X**) Drawing(s): Number of Sheets Enclosed: (In Triplicate): **36 sheets**

Formal: **12 sheets**
Informal: **24 sheets**

(**X**) Small Entity Declaration of Inventor: **1 sheet**

(**X**) Petition to Make Special: **1 sheet**

(**X**) Declaration in Support of Accompanying Petition to Make Special: **3 sheet**

(**X**) Information Disclosure tatement: **1 sheet**

(**X**) Form-1449 and the Pertinent Parts of the References: **19 sheets**

(**X**) Check: **# 1288** of **06.26.97** for **$ 385.00** for:

(**X**) $ **385.00** for filing fee (not more than three independent claims and twenty total claims are presented).

(**X**) Return Receipt Postcard Addressed to Applicant.

(**X**) Request Under MPEP § 707.07(j): The undersigned, a pro-se applicant, respectfully requests that if the Examiner finds patentable subject matter disclosed in this application, but feels that Applicant's present claims are not entirely suitable, the Examiner draft one or more allowable claims for applicant.

Very respectfully,

Applicant Signature

ALEKSANDR L. YUFA
Name

P.O. BOX 1677
Address (Send Correspondence Here)
COLTON , CA. 92324

Express Mail Label # EI25747309 6US ; Date of Deposit: _____

I hereby certify that this paper or fee is being deposited with the United States Postal Service using "Express Mail Post Office To Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to "Assistant Commissioner for Patents, Washington, DC 20231."

Signed:

Inventor: 

Patent Application of ALEKSANDR L. YUFA

for

METHOD AND DEVICE FOR COUNTING AND MEASURING PARTICLES

FIELD OF THE INVENTION

This invention relates to air and liquid quality and, more particularly, to devices and instruments for particle quantity counting and particle size measuring by light scattering.

BACKGROUND OF THE INVENTION

The methods and devices for determining quantity and size of the particles and small bodies are now well known, and it is also well known that powerful light or laser and optical system or mirror can be, and have been, heretofore used to achieve particle size and particle quantity measurements. Such devices using light scattering are well known and described in the articles: R.G.Knollenberg, B.Schuster--"Detection and Sizing of Small Particles in Open Cavity Gas Laser," Applied Optics, Vo.11, No.7, November 1972, pp.1515-1520; R.G.Knollenberg--"An Active Scattering Aerosol Spectrometer," Atmospheric Technology, No.2, June 1973, pp.80-81; Schehl, Ergun, Headrick--"Size Spectrometry of Aerosols Using Light Scattering from the Cavity of a Gas Laser," Review of Scientific Instruments, Vol. 44, No. 9, September 1973; R.G.Knollenberg--"Active Scattering Aerosol Spectrometry," National Bureau of Standards Special Publication, No.412, October 1974, pp.57-64; R.G.Knollenberg, R.E.Luehr--"Open Cavity Laser 'Active' Scattering Particle Spectrometry from 0.05 to 5.0 Microns," Fine Particles,

Aerosol Generation Measurement, Sampling and Analysis, Academic Press, May 1975, pp.669-696; R.G.Knollenberg--"Three New Instruments for Cloud Physics Measurements: The 2-D Spectrometer, the Forward Scattering Spectrometer Probe, and the Active Scattering Aerosol Spectrometer", American Meteorological Society, International Conference on Cloud Physics, July 1976, pp. 554-561; R.G.Knollenberg --"The Use of Low Power Laser in Particle Size Spectrometry", Proceeding of the Society of Photo-Optical Instrumentation Engineers, Practical Applications of Low Power Lasers, Vo.92, August 1976, pp.137-152; Elterman--"Brewster Angle Light Trap," Applied Optics, Vol. 16, No. 9, September 1977; Marple--"The Aerodynamics Size Calibration of Optical Particle Counters by Inertial Impactors," Aerosol Measurement, 1979; Diehl, Smith, Sydor--"Analysis by Suspended Solids by Single-Particle Scattering," Applied Optics, Vol. 18, No. 10, May 1979; K.Suda--Review of Scientific Instruments, Vol. 51, No. 8, August 1980, pp.1049-1058; R.G.Knollenberg--"The Measurement of Particle Sizes Below 0.1 Micrometers", Journal of Environment Science, January-February, 1985, pp. 64-67; Peters--"20 Good Reasons to Use In Situ Particle Monitors", Semiconductor International, Nov. 1992, pp.52-57 and Busselman et al.--"In Situ Particle Monitoring in a Single Wafer Poly Silicon and Silicon Nitride Etch System", IEEE/SEMI Int'l Semiconductor Manufacturing Science Symposium, 1993, pp.20-26.

The reference in these articles is made to the devices and methods of particle measurement utilizing an open cavity laser. These methods and devices use imaging systems, which are based

on lens use, the same as it mentioned, for example, in U.S. Patent No. 4,140,395, U.S. Patent No.4,798,465 and in U.S. Patent No. 5,495,105 of the prior art.

The other devices mentioned in prior art (for example, U.S. Patent No. 4,606,636) use a non-divergent quadric reflector. Such devices use a paraboloidal sphere as mirror.

Yet in other prior art (for example, such as U.S. Patent No. 4,189,236, U.S. Patent No. 4,523,841, U.S. Patent No. 5,467,189 and U.S. Patent No. 5,515,164) we can find the devices (sensors) with ellipsoidal mirrors instead of the lens systems or non-divergent quadric mirrors.

All these devices, mentioned in the prior art above, use light scattering focalizing methods. Such methods are based on the collection of the scattered light. A light scattering occurs at the first focal point (focus) by particles in the laser beam. Considering stochastic dispersion of the scattered light, the devices, mentioned in the above prior art, use mirrors or optics. This is necessary for scattered light collecting and focalizing at the second focal point (focus), where a light detector is placed and intended for scattered light detection.

Another known method uses direct detection, as it mentioned in U.S. Patent No.5,085,500. By this method, the scattered light in such devices is detected by the light detectors directly with no scattered light collection.

As shown on Fig.1, related to the use of the optics, regarding the U.S. Patents No.4,140,395, No. 4,798,465, and No. 5,495,105, the scattered light 6 is collected by the optical system 10, which is presented by the lenses.

On Fig.2 is presented the device, using non-divergent quadric mirror, (U.S. Patent No. 4,606,636). From Fig.2 we see that the collection of the scattered light is provided by non-divergent quadric mirror 18.

The counting and measuring devices (sensors), mentioned in the U.S. Patents No. 4,189,236, No. 4,523,841, No. 5,467,189, and No. 5,471,299, using an ellipsoidal mirrors 17, are presented on simplified Fig.3.

On Fig.4 is presented the particle sensor by U.S. Patent No. 5,515,164, also using the ellipsoidal mirror for the scattered light collection. This sensor uses especially increased cross-section outlet area of the particle flow.

On Fig.5 is shown a simplified drawing of the device, using the direct detection method.

It is understood, that the methods and devices, mentioned of the prior art of the above, require the use of the scattered light collection means and systems (Figs.1-4) or very large spatial surface of the light detector or sufficient quantity of the light detectors (Fig.5). Such methods and/or devices need to include expensive means and systems. Also, the mentioned above methods and devices have a common deficiency, which is contained in the non-consideration of all scattered light plurality (for example, a scattered light 23 on Figs.1-5) and non-precise focalizing of the particle flow (for example, a scattered light 7 on Figs.1-5).

It is known, that integrated circuits (chips) and semiconductors have been produced in "clean rooms". The air in such "clean rooms" should be very well cleaned. The continuing tendencies of improvement in circuit integration and degree of microminiaturization require corresponding

improvements of the environment in "clean rooms" and efficiency of the measuring devices. And now, as known from prior art, the sensitivity of the counting and measuring devices should be at least as small as 0.1μm (Micron).

Thus, the unfocused and/or unconsidered (undetected) scattered light in the mentioned above devices of a prior art creates light background (light noises) inside such devices, creating thereby incorrectness of the resulting information about the measured environment. Additionally, such light noises limit the sensitivity of such devices.

OBJECT AND ADVANTAGES OF THE INVENTION

Accordingly, several objects and advantages of the present invention are to provide an improved method and device for counting and measuring particles.

It is another object of the invention to provide an improved method and device for increasing the precision of particle counting and measuring.

It is still another object of the invention to provide an improved method and device for increasing the efficiency of the measuring and counting process.

It is still further an object of the invention to provide an improved method and device for increasing the authenticity of the information about air or liquid composition.

It is yet another object of the invention to provide an improved method and device for decreasing light noises by the elimination of unfocused and/or unconsidered scattered light.

It is another further object of the invention to provide an improved method and device for increasing sensitivity of the particle size detection by the elimination of the scattered light collection.

Still, further objects and advantages will become apparent from a consideration of the ensuing description accompanying drawings.

DESCRIPTION OF THE DRAWING

Fig.1 is a presentation of the scattered light collection by an optics in the prior art devices.

Fig.2 is a presentation of the scattered light collection by a non-divergent quadric mirror in the prior art devices.

Fig.3 is a presentation of the scattered light collection by an ellipsoidal mirror in the prior art devices.

Fig.4 is a presentation of the scattered light collection by an ellipsoidal mirror with the especially increased inlet cross-sectional area of the particle flow in the prior art devices.

Fig .5 is a presentation of the scattered light direct detection method in the prior art devices.

Fig.6 is a presentation of the simplified drawing of the light detecting system of the improved method and device for airborne particles.

Fig.7 is presentation of the simplified drawing of the light detecting system of the improved method and device for liquid particles (contaminations).

Fig.8 is a presentation of the block diagram of an improved device.

Fig.9 is a presentation of the block-diagram of the first variant of the analog-digital subsystem of an improved device.

Fig.10 is a presentation of the block-diagram of the second variant of the analog-digital subsystem of an improved device.

Fig.11 is a presentation of the signal timing-diagram.

Fig.12 is a representation of the block-diagram of an improved device with remote light beam source.

SUMMARY OF THE INVENTION

The invention provides a method and device, having a high sensitivity and a precision of counting and measuring particles, wherein achieving a particle size sensitivity achieves at least as small as 0.1μm. An improved method of counting and measuring particles forms direct detection processes, eliminating the light scattering detection principles. An improved device, realizing the improved direct detection method, includes a light detecting system and a processing system, including an analog-digital subsystem and a control subsystem. A light or laser beam intersects a particle flow inside a light detecting system in the light detection means area. The light detection means is placed on the light beam axis. The signals detected by light detection means through an analog-digital subsystem follow to a processing system for processing of the signals and displaying information. The improved method and device provide the amplitude or timing processing of the detected signals.

By an improved method, the improved amplitude processing of the detected signals is provided by comparison of reference voltage, determined by appropriate size of the particle, with the amplified detected signal, relative to the decreased intensity of the light beam by an obstruction created by the particle, flowing through the light beam. By an improved method, the improved timing processing of the detected signals is provided by strobing the digital pulses created from the amplified detected signals, having the different durations created by different size particles, intersecting the light beam.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Here the description of an improved method and device will be done in statics (as if the components of the improved device are suspended in the space) with description of their relative locations and connections to each other. The description of the improved processes and functional operations of an improved device will be done hereafter.

Referring to Figs.6, 7, 8 a light detecting system 11 includes a chamber 12, a light beam axis 2 (a laser beam can be used), a particle flow along axis 3, a light detection means 4 and a particle flow tubular means 26. The particle flow tubular means 26, intended for airborne particles, is interrupted in the light detection means 4 area (see Fig.6). A chamber 12 of the light detecting system 11 has black flat (rough) inside coating, absorbing possible reflected light and eliminating thereby possible light background (light noises).

On Fig.8 is shown the block-diagram of an improved device, including a light detecting system 11, connected to an analog-digital subsystem 14 of a processing system 27. The analog-digital subsystem 14 is connected to a control subsystem 13 of a processing system 27. The control subsystem 13 includes a microprocessor subsystem 20 and a terminal means 21.

Referring to Fig.9, an analog-digital subsystem, regarding amplitude method processing of the detected light signals, includes an amplifying means 15, connected to a comparison means 16, which is connected to a reference voltage means 19. A comparison means 16 is connected to an analog-digital converting means 22.

On Fig.10 is presented an analog-digital subsystem, realizing time method processing of the detected light signals. Mentioned analog-digital subsystem comprises an amplifying means 15, connected to a pulse forming means 24.

Fig.11 presents a timing diagram of the signal processing. On this figure τ_i represents a duration of the pulses, where $i = 1, 2, 3, \ldots$.

On Fig.12 is presented a structure of an improved device with a remote light beam source, comprises a remote light beam source 28, connected by fiber optic means 29 to a light detecting system 11, which is connected to a processing system 27, including a microprocessor subsystem 20 and a terminal means 21.

An improved device operates as follows. The light or laser beam along axis 2 intersects a particle flow along axis 3 in the area of a light detection means 4, placed on a light beam axis 2, as

shown on Figs.6, 7. When the particles of the particle flow intersect the light beam, the intensity of the light beam on the light detection means 4 will be less than at the time when the particles are missing, because the presence of a particle in the light beam obstructs the light to the light detection means 4.

The signals detected by the light detection means 4, (see Fig.11a) follow to the analog-digital subsystem 14 of a processing system 27 of an improved device (see Fig.8). As shown on Figs.9, 10, these signals from light detection means 4 of the light detecting means 11 follow to the amplifying means 15.

An improved method makes possible an amplitude processing of the detected signals (see Figs.9, 11) or a timing processing of the detected signals (see Figs.10, 11).

On Fig.9 is shown the block-diagram of the analog-digital subsystem 14 from Fig.8, regarding the amplitude processing method. Referring to Fig.9, the signals amplified by the amplifying means 15 (Fig.11b), follow to a comparison means 16, to which also follows the appropriate reference voltages from a reference voltage means 19. The reference voltages are determined by appropriate sizes of the particles. The signals from the comparison means 16 follow to an analog-digital converting means 22.

Referring to Fig.10, the signals amplified by the amplifying means 15 (Fig.11b) follow to the pulse forming means 24, which forms the digital pulses (Fig.11c) from the analog signals of the amplifying means 15. The pulse forming means 24 also comprises an internal interface means (not

shown) for comunication by multiplexed bus 25 (or a data bus and an address bus, which are not shown).

Referring again to Fig.8 and considering Figs.9, 10, the signals from the analog-digital subsystem 14 follow by a multiplexed bus 25 to the control subsystem 13. For the time processing method, mentioned above, the signals (Fig.11c) from the analog-digital subsystem 14 are strobed by the strobe pulses (see Fig.11d) in the control subsystem 13. The signals (Fig.11e) processed by microprocessor subsystem 20 have different durations τ_i. These durations are related to the different sizes of particles, which create different obstructions of the light beam. The higher the frequency of the strobe pulses, the higher the sensitivity of the improved device:

$$S = f(F_P) \qquad [1]$$

and

$$S \to \infty \Big|_{F_P \to \infty} , \qquad [2]$$

where S - a sensitivity;

f - a functional symbol (a function);

F_P - a strobe pulses frequency.

The microprocessor subsystem 20 is also connected by the multiplexed bus 25 to a terminal means 21, which can include a display means, a printing means, a compact disc (CD) means, a

subsystem 14 and by multiplexed bus 25 to the microprocessor subsystem 20.

Referring to Fig.12, the light beam or laser beam is transferred from a remote light beam source (or remote laser beam source) 28 to the chamber 12 (see Figs.6, 7) of a light detecting system 11 by a fiber optic means 29.

CONCLUSION, RAMIFICATION AND SCOPE

Accordingly the reader will see that, according to the invention, I have provided a precise and effective method and device, which provides counting and measuring of all particles of the assayed air (gas) or liquid. An improved method and device provide authenticity of the real quantity and size of the particles in the assayed mixture of air or liquid, because all particle plurality is considered. Also the improved method and device provide correctness of the resulting information, because the light noise (light background) inside an improved device is eliminated.

While the above description contains many specificities, these should not construed as limitations on the scope of the invention, but as exemplification of the presently-preferred embodiments thereof. Many other ramifications are possible within the teaching of the invention. For example, an improved method and device provide authentic counting and measuring of particles, because very precise focusing of the mirrors or optics is not required. The procedure of periodical calibration is much easier for improved amplitude processing of the detected signals, because an improved method and device does not require the consideration of the light background (created by

tion is much easier for improved amplitude processing of the detected signals, because an improved method and device does not require the consideration of the light background (created by unfocused and/or unconsidered scattered light, as it presents in the known prior art, mentioned above). The improved timing processing of the detected signals provides unlimited sensitivity of the improved device and eliminates necessity of the periodical calibration by manufacturer. Also an improved device uses a single small light detector.

Thus, the scope of the invention should be determined by the appended claims and their legal equivalents, and not by examples given.

ABSTRACT

A device for counting and measuring particles provides an analysis of the particle characteristics without the use of light scattering collection principles and includes a processing system 27, comprising control subsystem 13 and an analog-digital subsystem 14, and a light detecting system 11, providing particle direct detection counting and measuring by analysis of the different amplitude detected signals or by analysis of the different light beam intensities, created by obstructions as result of intersection a particle flow along axis 3 with a light beam along axis 2 inside the light detecting system 11 in the area of a light detection means 4, placed on the axis 2.

The light beam intensity analysis is provided by amplitude processing of the detected signals by comparison the reference voltages, determined by appropriate size particles, with the appropriate amplified detected signals, determined by decreased intensity of light beam during particle passage, or by timing processing of the digital pulses of the amplified detected signals, strobing of the detected signals, having different durations as a result of different size particle flowing through the light beam.

CLAIMS

What is the claimed is:

1. A method for counting and measuring a particles illuminated by a light beam and including the steps, wherein:

detecting said light beam by a light detecting system, including a chamber of said light detecting system, inside which a particle flow intersects a light beam in an area of a light detection means, placed on a light beam axis, and wherein an intersection of said light beam and said particle flow is occurred on said light beam axis between a light beam source and said light detection means;

detecting said light beam, which is obstructed by a different sizes of said particles of said particle flow, has a differing intensity of said light beam on said light detection means or a different durations of said intensity;

detecting said differing intensity of said light beam or said different durations of said intensity by said light detection means, which transfers a detected signals for a detected signal processing to a processing system.

2. The method of claim 1, wherein said detected signal processing is provided by an amplitude comparison of said detected signals with an appropriate reference voltages, determined by an appropriate sizes of said particles of said particle flow.

3. The method of claim 2, wherein said detected signals are amplified before said amplitude comparison.

4. The method of claim 1, wherein said detected signal processing is provided by a timing processing of said detected signals by strobing said detected signals by a strobe pulses, and wherein a strobed pulses have said different duration, determined by said different sizes of said particles of said particle flow, passing through said light beam.

5. The method of claim 4, wherein said detected signals are amplified and transformed to a digital forms before said timing processing.

6. A device for counting and measuring a particles, including a light detecting system and a processing system.

7. The device of claim 6, wherein said light detecting system includes a chamber, a light beam, a particle flow, a tubular particle flow means and a light detection means, wherein said particle flow intersects said light beam on a light beam axis in an area of said light detection means, which is placed on said light beam axis.

8. The device of claim 7, wherein said particle flow intersects said light beam on said light beam axis at a point, which is between a light beam source and said light detection means.

9. The device of claim 7, wherein said tubular particle flow means is interrupted in said area

of said light detection means for an airborne particle analysis.

10. The device of claim 6, wherein said processing system includes an analog-digital subsystem and a control subsystem.

11. The device of claim 10, wherein said analog-digital subsystem is connected to a light detecting system, and by a multiplexed bus is connected to said control subsystem, which includes a microprocessor subsystem and a terminal means, connected by said multiplexed bus.

12. The device of claim 11, wherein said multiplexed bus is splited on a data bus and an address bus, and a digital data exchange is provided by said data bus and said address bus.

13. The device of claim 11, wherein said terminal means includes a display means, a printing means, a compact disc means, a floppy disc means, connected by said multiplexed bus, and an external interface means.

14. The device of claim 10, wherein said analog-digital subsystem for an amplitude processing of a signals from a light detecting system includes a an amplifying means, connected to a comparison means, connected to an analog-digital converting means, and a reference voltage means, connected to said comparison means.

15. The device of claim 10, wherein said analog-digital subsystem for a timing processing of a signals from a light detecting system includes an amplifying means, connected to a pulse forming

means.

16. A device for counting and measuring a particles includes a light detecting system, a processing system, a remote light beam source and a fiber optic means.

17. The device of claim 15, wherein said remote light beam source is connected to said light detecting system by said fiber optic means.

THE DRAWING REFERENCE NUMERALS WORKSHEET

1. - a device axis;

2. - a light beam axis;

3. - a particle flow axis;

4. - a light detection means;

5. - a light detector;

6. - a focused scattered light;

7, - an unfocused scattered light;

8. - a first focus;

9. - a second focus;

10. - an optical system;

11. - a light detecting system;

12. - a chamber;

13. - a control subsystem;

14. - an analog-digital subsystem;

15. - an amplifying means;

16. - a comparison means;

17. - an ellipsoidal mirror;

18. - a non-divergent quadric mirror;

19. - a reference voltage means;

20. - a microprocessor subsystem;

21. - a terminal means;

22. - an analog-digital converting means;

23. - an unconsidered scattered light;

24. - a pulse forming means;

25. - a multiplexed bus;

26. - a particle flow tubular means;

27. - a processing system;

28. - a remote light beam source;

29. - a fiber optic means.

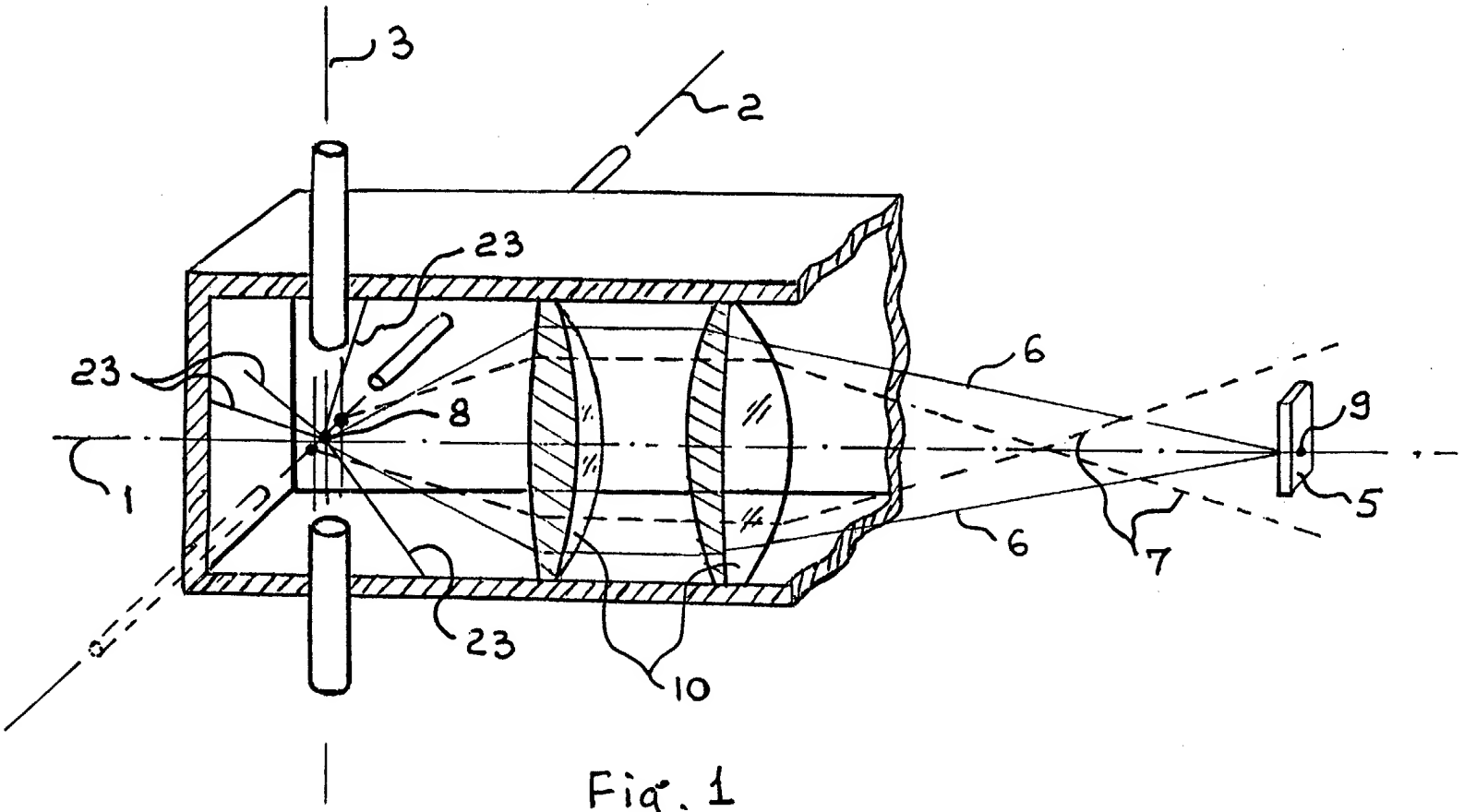

Fig. 1
(A PRIOR ART)

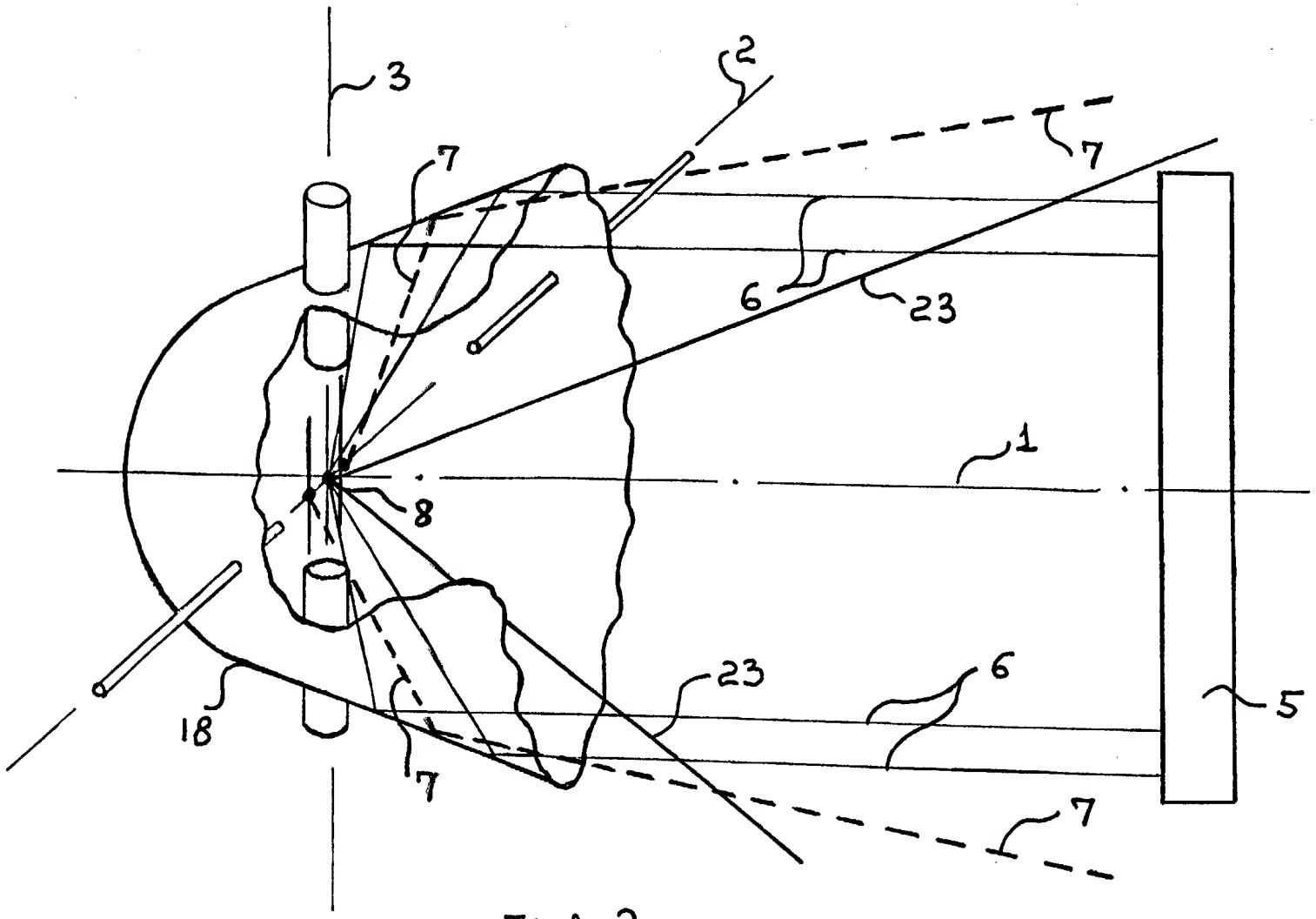

Fig. 2
(A PRIOR ART)

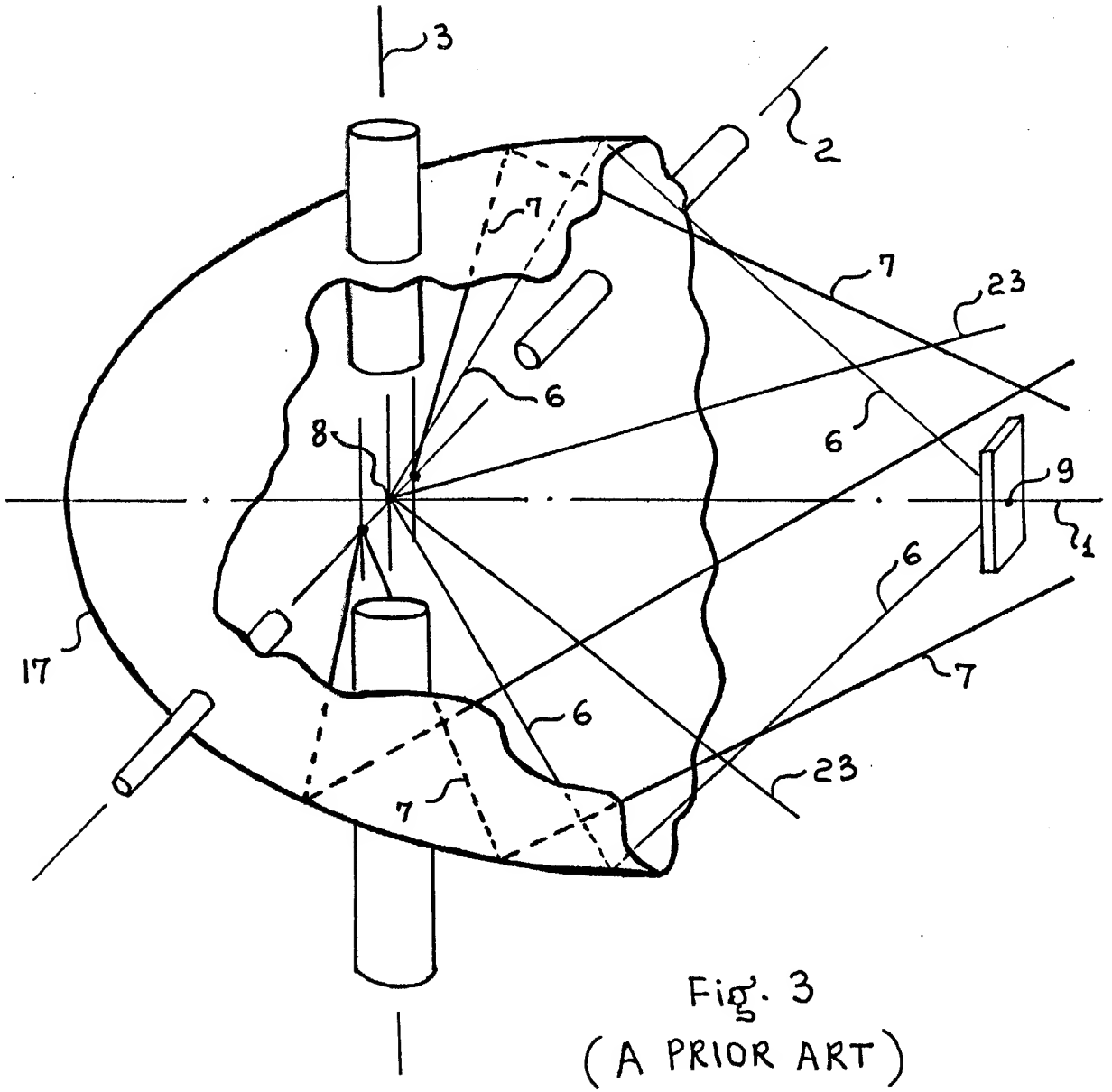

Fig. 3
(A PRIOR ART)

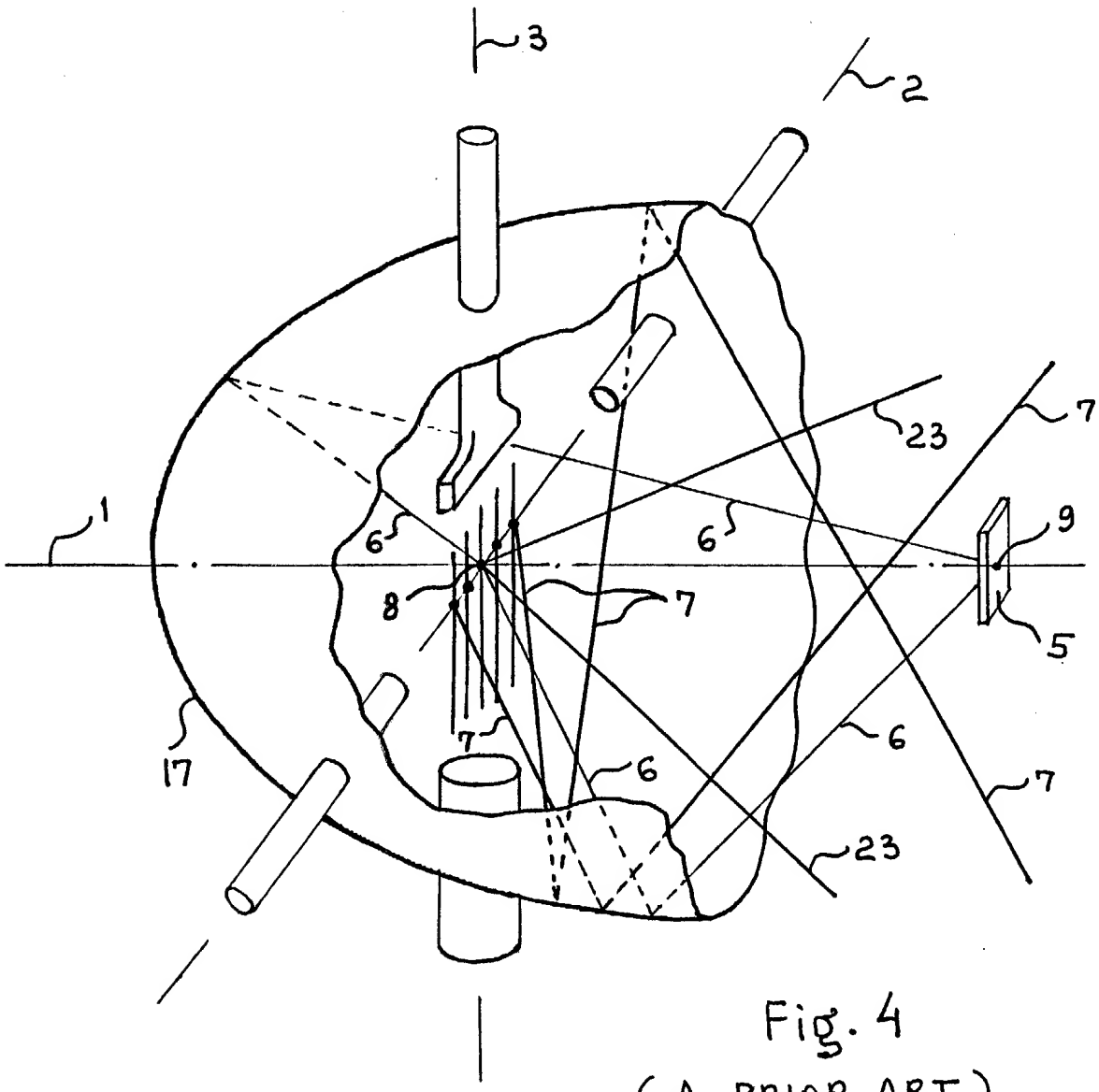

Fig. 4
(A PRIOR ART)

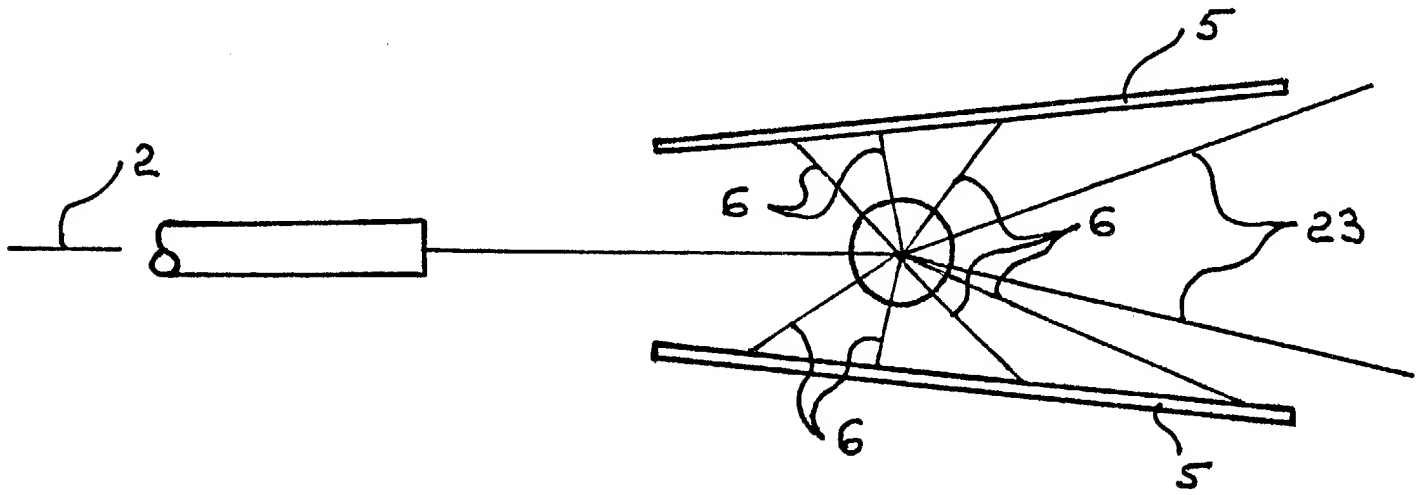

Fig. 5
(A PRIOR ART)

Fig. 6

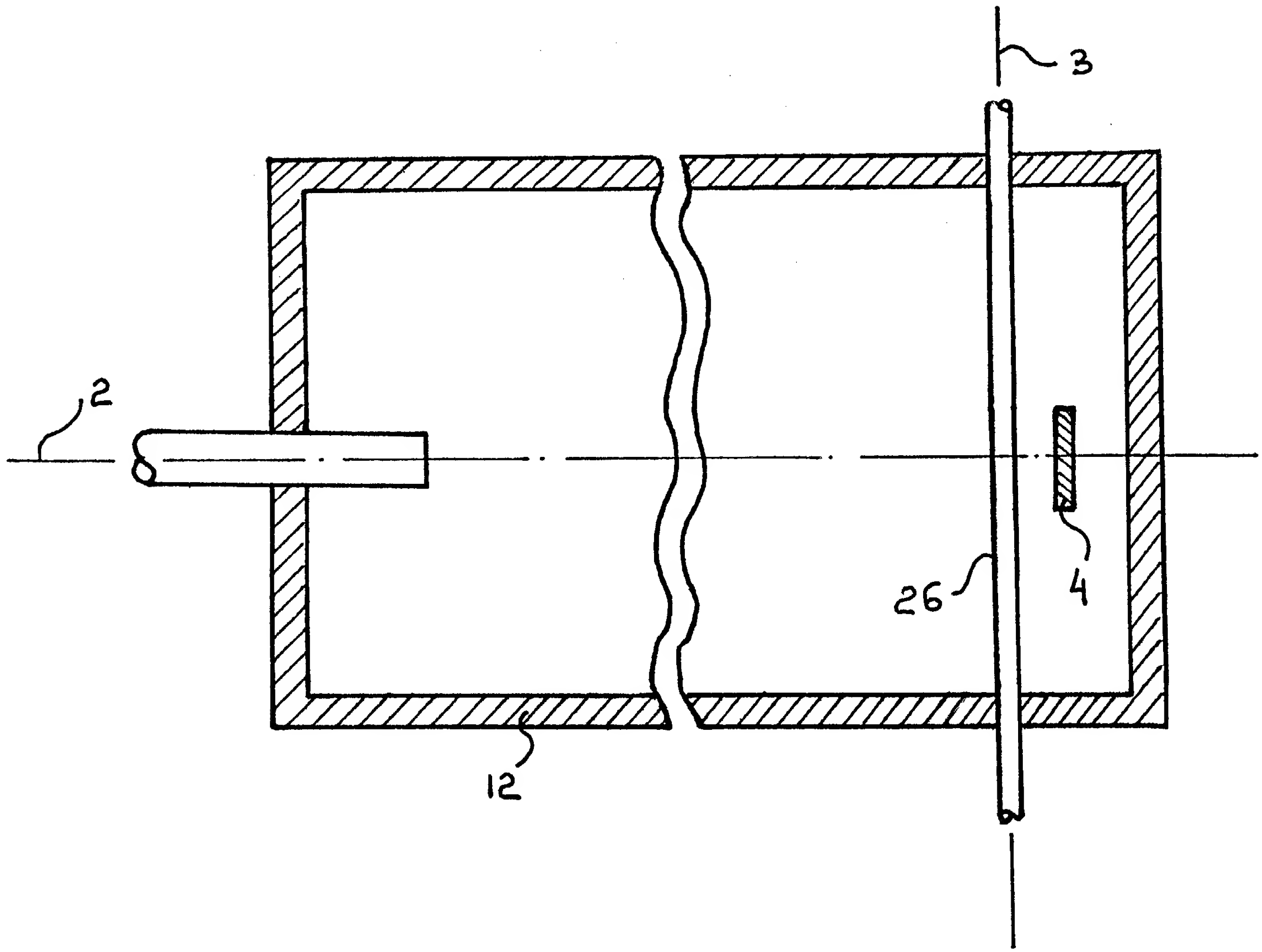

Fig. 7

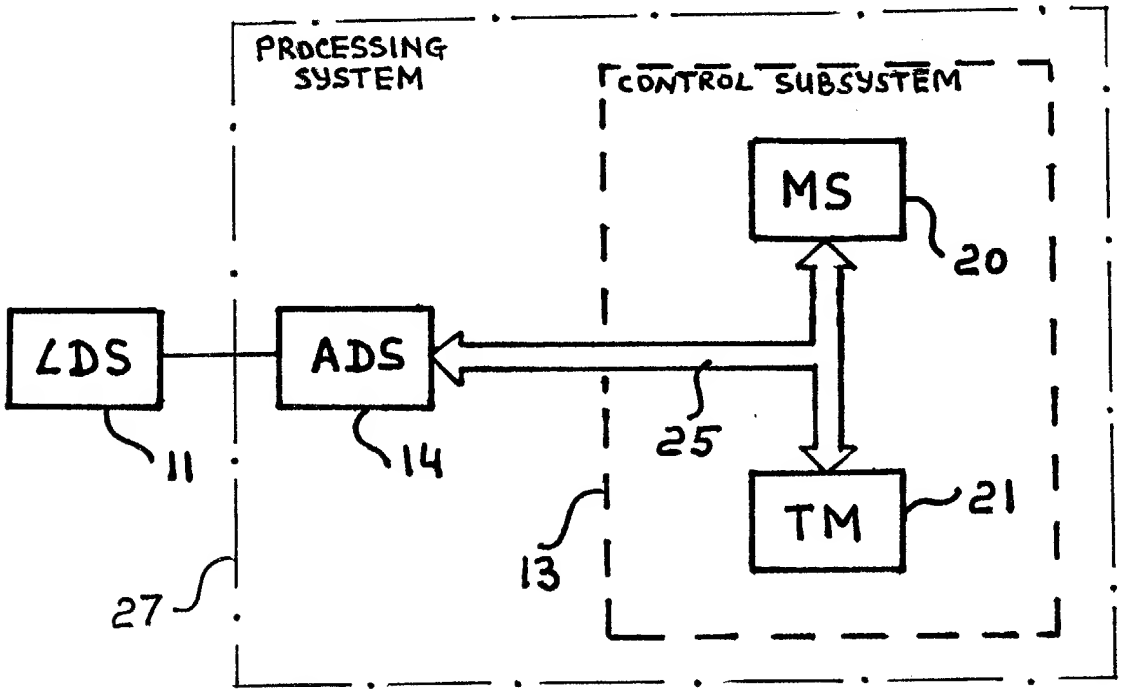

Fig. 8

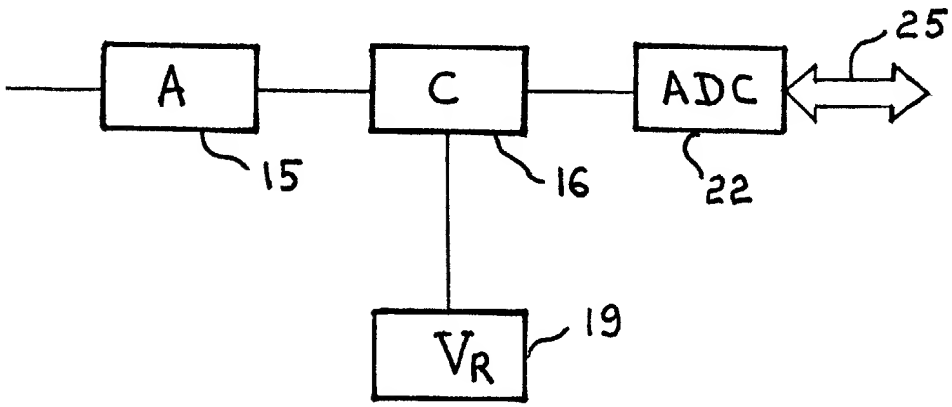

Fig. 9

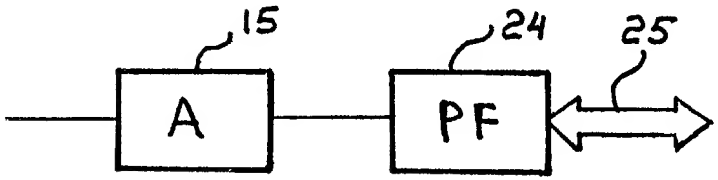

Fig. 10

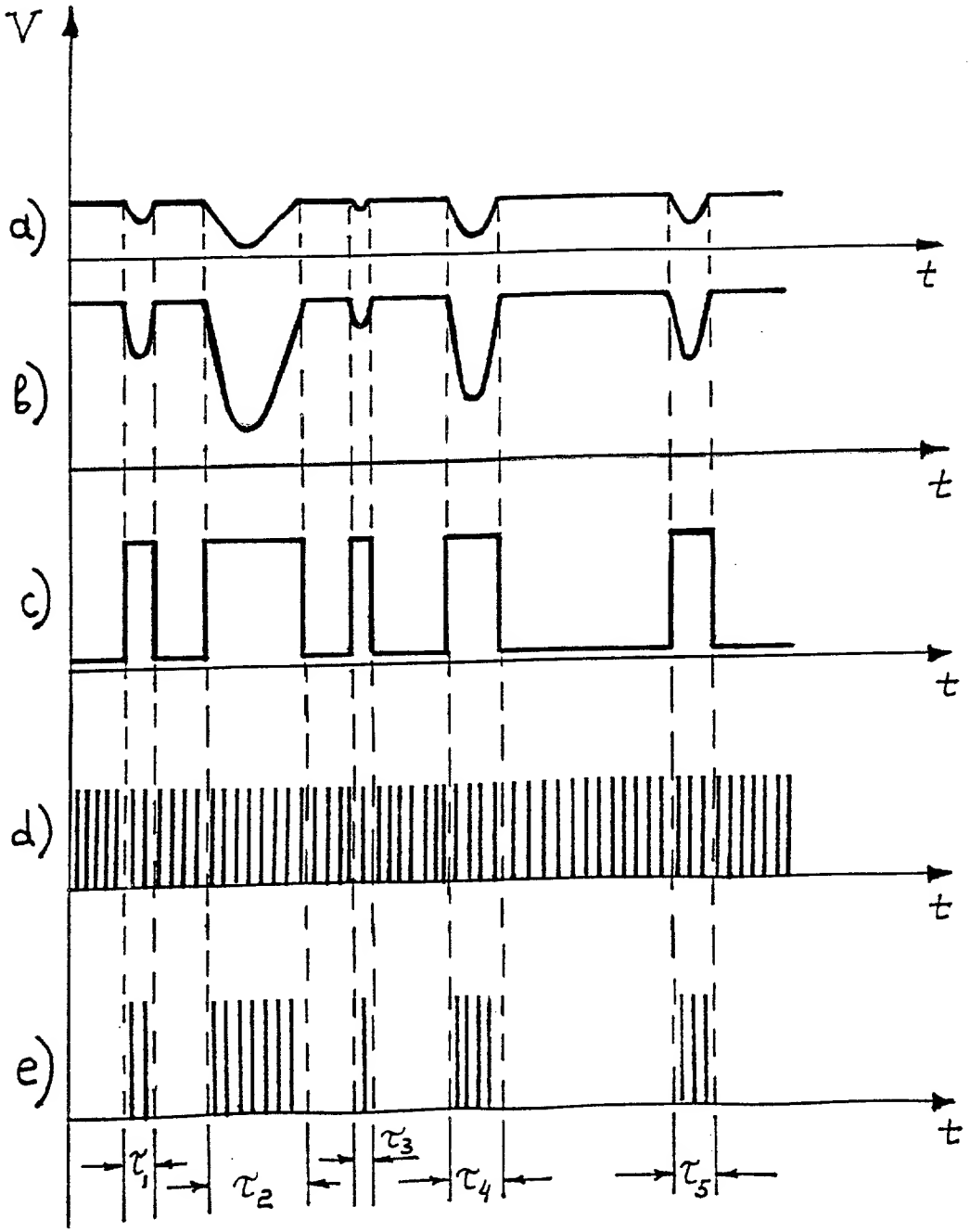

Fig. 11

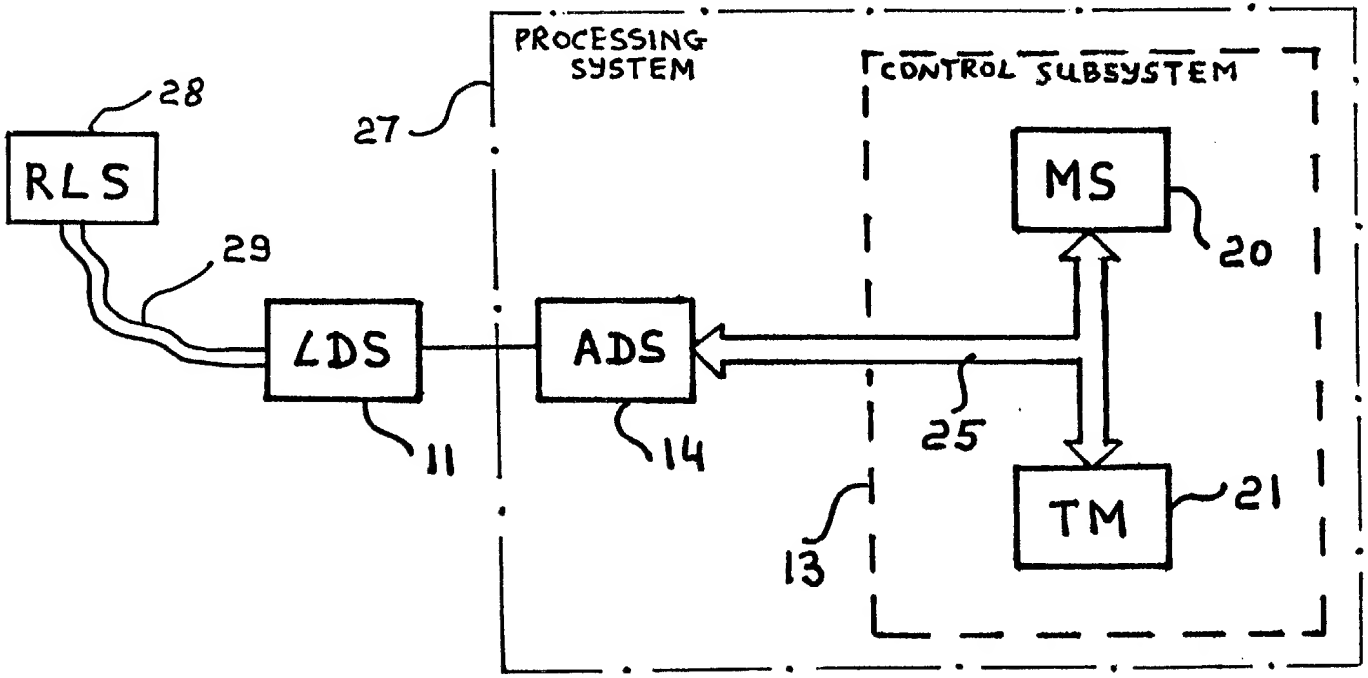

Fig. 12

In the United States Patent and Trademark Office

Sole Applicant: **ALEKSANDR L. YUFA**
Other Applicant(s): N/A
Title: **"METHOD ANS DEVICE FOR COUNTING AND MEASURING PARTICLES"**

Small Entity Declaration - Independent Inventor(s)

As a below-named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35 United States Code, to the Patent and Trademark Office with regard to my above-identified invention described in the specification filed herewith. I have not assigned, granted, conveyed, or licensedand am under no obligation under any contract or law to assign, grant, convey, or license any rights in the invention to either (a) any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or (b) any concern which would not qualify as either (i) a small business concern under 37 CFR 1.9(d) or (ii) a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

(**X**) There is no such person, concern, or organization.

( ) Any applicable person, concern, or organization is listed below:

Full Name: N/A
Address: N/A

I acknowledge a duty to file, in the above application for patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Signature	ALEKSANDR L. YUFA	June 26, 1997
	Name	Date

Declaration for Utility Patent Application

As a below-named inventor, I hereby declare that my residence, post office address, and citizenship are as stated below next to my name and that I believe that I am the original, first, and sole inventor [if only one name is listed below] or an original, first, and joint inventor [if plural names are listed below] of the subject matter which is claimed and for which a patent is sought on the invention, the specification of which is attached hereto and which has the following title:

"METHOD AND DEVICE FOR COUNTING AND MEASURING PARTICLES"

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration. I acknowledge a duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Please send correspondence and make telephone calls to the Inventor below.

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